BARILLA CENTER
FOR FOOD & NUTRITION

EATING PLANET

FOOD AND SUSTAINABILITY: BUILDING OUR FUTURE

Edizioni
Ambiente

Barilla Center for Food & Nutrition

EATING PLANET

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BCFN: WORKING TOGETHER TO SOLVE THREE PARADOXES

*Guido Barilla**

The Barilla Center for Food & Nutrition (BCFN) was set up in 2009 as a research center with a multidisciplinary approach to study and deepen our understanding of the many complex global issues related to food and nutrition. From the beginning, we focused on three great paradoxes characterizing the current global food system that can no longer be ignored. The first edition of *Eating Planet* already zeroed in on these paradoxes, but it is worth repeating them here as a reminder of just how stark they are: first, for every person who is undernourished in the world today, there are two people who are considered overweight. Approximately 795 million people in the world currently suffer from hunger or famine, while 2.1 billion people are overweight or obese.

The second paradox concerns agriculture: some 40% of harvested crops are used to produce animal feed and biofuels, despite all the people suffering from hunger. We deliberately choose to provide fuel for our cars rather than feed people in perpetual need.

The third paradox is tied to food waste: globally, we throw out one third of all food produced, four times what would be enough to feed those 795 million undernourished people worldwide.

In recent years, we have become increasingly aware of the extreme urgency of these issues, and of the need to provide answers. In response, we have developed the double food and environmental pyramid, which has grown from a mere model into a true research agenda: animated by new data and scholarly contributions, it is receiving an increasing amount of attention in an ever-broader range of scientific fields. In addition to its scientific value, the double pyramid also contains practical implications as simple as they are powerful: If we eat well, we naturally do some good both to ourselves and to our planet!

In 2014, the Barilla Center for Food and Nutrition (now the BCFN Foundation) developed the *Milan Protocol*, with the goal of raising awareness among governments, institutions, and the wider general public regarding the urgent need for action to make the global food system truly sustainable. Developed by the Foundation's Scientific Committee, the Protocol has received contributions from more than 500 international experts, while gaining the support of more than one hundred organizations and thousands of individuals.

The Protocol's three objectives are directly linked to the three paradoxes that are the focus of the BFCN: promoting healthy lifestyles, encouraging more sustainable agriculture, and reducing food waste by 50% by 2020.

The *Milan Protocol* inspired the *Milan Charter*—the proposed global agreement to guarantee healthy, safe, and sufficient food for all—promoted by the Italian government as the main legacy of Milan's Expo 2015 and presented to the Secretary General of the United Nations Ban Ki-moon.

The *Milan Protocol* was developed by the Foundation's multidisciplinary Advisory

Board, with important contributions from many international experts, civil society, and the youth network that the BCFN has sponsored for years: the BFCN Alumni.
These young researchers from around the world took part in a competition held by the Barilla Foundation to come up with innovative and practicable ideas for a more sustainable food system: the BFCN Young Earth Solutions, or BFCN YES! In September 2015 we brought these Alumni to Italy and asked them to express their thoughts—in the form of concrete plans and projects—regarding the future of food and nutrition. This gave birth to the *BFCN Youth Manifesto*, a document that contains seven actionable proposals to confront the challenges presented by the food paradoxes via seven key roles in the food system: policymakers, farmers, educators, food industry, business people, journalists, activists, and researchers.
The *Youth Manifesto* was delivered and presented to the various national and international institutions that took part at the Milan Expo: an assumption of great responsibility on the part of these young men and women—for they will be the ruling class of of the future—and a strong appeal to world leaders.
After three years we thought it was time to update *Eating Planet* to reflect the advances made by the BCFN Foundation: studies and concrete proposals concerning the big issues surrounding food and nutrition, with significant contributions by an increasingly multidisciplinary scientific team, and close attention to the role and ideas of the younger generations, into whose hands we will bequeath this planet.
The second edition of this volume maintains the same organization as the first—divided into the four macro-areas "Food for All," "Food for Sustainable Growth," "Food for Culture," and "Food for Health"—revised and enriched with meaningful content from members of the Advisory Board and from several internationally-recognized figures and experts, whom we would like to recognize here: Pavan Sukhdev, Gianfranco Bologna, Barbara Buchner, Paolo De Castro, Danielle Nierenberg, Paul Roberts, Carlo Petrini, Riccardo Valentini, Hans R. Herren, Tony Allan, Ricardo Uauy, Sara Farnetti, Camillo Ricordi, Gabriele Riccardi, Marion Nestle, Aviva Must, Alexandre Kalache, Shimon Peres, Jamie Oliver, Ellen Gustafson, Michael Heasman, Vandana Shiva.
The forecasts for the future—as demonstrated by the 17 Sustainable Development Goals proposed by the United Nations—present a considerable challenge. The rapid pace of change in the external scenarios we must confront reinforces our pressing need to better understand worldwide phenomena like climate change, migration, variations in eating habits, and the sustainability of agriculture. These are all themes that the BCFN has studied and will continue to study, offering objective and empirically validated perspectives: contributing to our knowledge of complex global phenomena so that we might confront them in the appropriate way to provide the best possible future for both people and the Planet.

** Chairman of the Barilla Center for Food & Nutrition Foundation*

EATING PLANET: FOOD BEYOND SIMPLIFICATIONS

*Pavan Sukhdev**

No subject today is perhaps so rich and deep and complex in its reality, and yet so poor and narrow and simplistic in its common portrayal, as is our food.

The challenges of our food and agricultural systems are still widely discussed, in media and even in policy and business, using narrow and simplistic metrics such as calories per person or tonnes per hectare. The main challenge of agriculture is still being widely discussed in terms of land availability to feed nine or ten billion by 2050. Such characterizations are both misleading and demeaning. They are in fact part of the problem of an inadequately understood and largely mis-managed eco-agri-food systems complex that is at the heart of all of the most important dimensions of our life on this planet's surface, be it nutrition, health, culture, employment, development, equity or the environment.

Eating Planet – Food and sustainability: building our future, by the Barilla Center for Food and Nutrition, is a very timely and important book which provides us the full picture of food and its importance to all of the above dimensions of our existence. It looks at food and agriculture not from a restricted lens of production alone, but from the perspective of equity and distribution ("Food for All"), from the perspective of environmental and ecological sustainability ("Food for Sustainable Growth"), from the perspective of health and diets ("Food for Health") and from the world of cultural values, richness and diversity ("Food for Culture").

As *Eating Planet* so well describes, we are challenged today with the need to achieve a very substantial and widespread transformation of the so-called "eco-agri-food systems complex": a collective term for the vast and interacting complex of ecosystems, agricultural lands, pastures, fisheries, labour, infrastructure, technology, policies, culture, traditions, and institutions including markets that are variously involved in growing, processing, distributing and consuming our food.

This multi-dimensional challenge is also the ultimate systems challenge. It involves transforming not one or two but indeed all the systems that enable us to produce, process, distribute and consume food and permeate every management framework, including political systems, global trade and markets. These systems involve forest and watershed management, agriculture, animal husbandry and fisheries, utilities such as freshwater and energy, and industries from mining and chemicals for fertilizers and pesticides, to food and beverage for processing, packaging, transportation, storage, distribution and retail, to the hospitality business, and last but not least, waste management, medicine and healthcare. And food and agriculture systems involve not just small or large farming business but also local communities everywhere, from urban residential and hobby farming neighbourhoods in the western world to tribal communities in Africa, Asia and elsewhere. Such is the complexity of the challenge on hand.

In his introduction to *Eating Planet*, Guido Barilla describes three important "para-

doxes" which are central to the challenges of our food system today, and which are the *raison d'être* of the Barilla Center for Food & Nutrition (BCFN). The first of these paradoxes is that almost 800 million people are still hungry or undernourished, while at the same time more than two billion are obese or significantly overweight, conditions that in turn leads to widespread suffering from diseases such as diabetes, whilst at the same time the planet already grows enough to feed nine-ten billion people today, let alone by 2050. This "paradox" is a many-faceted blow to our aspirations for solving poverty and achieving the pillars of sustainability, and it derives from a deep and complex set of failures in our food systems, including trade, distribution and political systems.

In the section "Food for All" this book investigates the errors inherent in reducing nutritional goods to the mere status of commodities, as has happened in recent times with their growing availability, and the failure of today's mechanisms of distribution to operate properly and serve people and communities facing hunger and malnutrition. The book also addresses the vital question of metrics. It points out why we are mistaken in being guided by an excessively narrow view of well-being, restricted to its economic dimension. By presenting an alternative (the "BCFN Index of Well-being") it builds another strong plank in the case for including a vast array of real facts that help define and describe the state of the social, politic, economic, and environmental conditions in which people live.

The section of the book entitled "Food for Health" deals with the need for balanced diets with low content of sugars, fats, and salt and with a high content of fruit, vegetables, and cereal grains. The book describes how and why this tends to reduce to a significant degree the negative factors that cause diet-driven disease and infirmities.

An important failing of today's food systems is in the design of diets and education around diets. There is at present too little policy support in most nations for nutritional models designed to take into account sustainability and health. Adequate public education is a common shortfall, leading to poor levels of public knowledge about what constitutes a healthy diet. Public interest campaigns targeted at changing damaging dietary habits are too few, and are rarely funded by governments. Herein lies an opportunity for businesses and governments: using the "double food pyramid" (explained in the section on "Food for Sustainable Growth" which recommends lower quantities of foods that are damaging to the environment and to human health) as an educational tool. It could go a long way in promoting healthy food for people, and sustainable food for the environment.

Such design and educational aspects are taking shape in some developed nations, in an attempt to face up to a health-care emergency linked to the rapid spread of metabolic, cardio-circulatory, and tumoral diseases and illnesses that derive from improper ways of eating.

However, as trends in diets in fast-developing nations follow trends in wealth, turning people further towards meats, the problems of design and education may not disappear, instead, they might just migrate to even larger populations in the fast-developing world. This situation is also a key driver of the "second paradox" mentioned in Guido

Barilla's introduction: the livestock challenge. There are over three billion heads of livestock. A third of food produced is to feed these animals, and half of agricultural GHG emissions are due to livestock. And there is a psychological tendency for communities coming out of poverty and into wealth to respond by including more meat in their diets, thus exacerbating these problems.
The search for solutions based on approaches that use reduced energy consumption and better knowledge will become one of the decisive aspects of sustainability in the eco-agri-food systems space. The fossil energy intensity of conventional agriculture is significant, and the use of agriculture for energy is the third "paradox" in the introduction to *Eating Planet,* viz, the increasing competition for land between energy and food, due to the increasing popularity of biofuel crops. The idea of using agricultural land for putting fuel in cars rather than food in hungry mouths seems to go against the grain of equity, ethics, sustainability and common sense.

The book's final section—"Food for Culture"—is a heart-warming tribute to food as a cultural and social activity, delivering value beyond nutrition. This is the dimension of food and agriculture that is perhaps being most deeply damaged by the global market-driven simplification and universalization of food. To stem this tide, it will be necessary to revive fundamental aspects of eating that are most focused on the bond between food, the individual, and her community. At the environmental and ecological level, it will be about protecting local crop varieties, preserving biological diversity. At the social level, this will be about transferring the culinary expertise and know-how about the preparation and serving of foods in unique and culturally enriching ways, returning to a healthy relationship with the land, and with the raw material by focusing on the excellence in quality of the ingredients, recovering age-old flavors, perhaps even making contemporary variants, and thus leading to the preservation of the best of the local culinary tradition.
The economic environment in which farmers and agricultural policy-makers operate today is distorted by significant externalities, both negative and positive. Indeed, many of the largest impacts on the health of humans, ecosystems, agricultural lands, waters, and seas arising from various different types of agricultural and food systems, are economically invisible, and do not get the attention they deserve from decision-makers in policy and business. There is therefore a need to evaluate all significant externalities of eco-agri-food systems, to better inform decision-makers in governments, businesses and farms. Furthermore, there is a need to evaluate the eco-agri-food systems complex as a whole, and not as a set of silos. *Eating Planet* is a significant step in the right direction to enlighten policy-makers, business, and society at large about the many dimensions of our eco-agri-food systems, the problems, and their solutions. Together with economic analysis of these challenges and solutions (being proposed by TEEB[1] and others) this book will be amongst the important works that contribute to a much

1 TEEB (*The Economics of Ecosystems and Biodiversity,* www.teebweb.org), a G8+5 initiative hosted by the United Nations, has just launched a global study on the size and scale of externalities along the value chain in different types of eco-agri-food systems.

better and holistic understanding of our food challenge. It will help create better and lasting food solutions for all—for the poor, for development, for the planet and for society and culture, for generations to come.

** UNEP Global Ambassador and, on behalf of this UN Agency, has led the project on* The Economics of Ecosystems and Biodiversity *(TEEB) commissioned to the United Nations by the European Commission and the German government. He is founder-CEO of GIST Advisory, an environmental consulting firm helping governments and corporations manage their impact on natural and human capital. He worked at the Deutsche Bank, on behalf of which he founded and chaired the Global Market Centre of Mumbai. He was special adviser and leader of the Green Economy Initiative for UNEP. He is the author of the essay* Corporation 2020 *(Island Press, Washington DC 2012)*

AGRICULTURE AND SUSTAINABILITY: OUR FUTURE IN THE ERA OF HUMANS

*Gianfranco Bologna**

Today, the world before our very eyes has changed dramatically compared to just 50-60 years ago and we are increasingly aware that many changes are occurring at an unprecedented rate. In just two generations, human activities have put extraordinary pressure on our planet's natural systems, which led us to outpace the Earth's ability to sustain our societies in a stable manner. In particular, starting from what the Global Change scientists define as "The Great Acceleration"[1] of human activities, which began in the 1950s, we have witnessed a colossal development of industry and agriculture, to the point where the world as we know it has come under threat. Today, human-caused impacts on a large scale, involving both local and global levels in an interconnected way (climate change, air pollution, human-induced pollution from chemicals, soil and water reserves degradation, massive loss of ecosystems and species, etc.) made human pressure become such a significant agent of transformation to be considered a true geological force on the planet, just as those that have shaped and changed the Earth over its 4.6 billion years. This is why the international scientific community believes that we have originated a new geological era, the Anthropocene, a blink of an eye in our planet's long history.[2]

As Johan Rockström clearly put it in his latest volume:[3] "We have gone from being a small world on a large planet to a big world on a small planet. This is a radical change. Our home is different and our future depends on what we will do." The unexpected is to be expected. More and more so today, and certainly in the future, change is the only constant. Surprises will be the new normality. We must change our mentality that has determined our cultural attitudes based on continuous and infinite growth, which, up until now, has underpinned the exploitation of natural systems in a planet clearly bound by its biophysical limits. It has now become imperative that we reconnect with nature and that societies reconnect with nature and all humankind with Earth, as it has also been brilliantly stated in Pope Francis' encyclical *Laudato si'*.

The great challenge to achieving sustainability in our development in the near future is to manage to understand what the optimal population numbers are and the relevant lifestyle necessary to respect the regenerative and carrying capacity of the natural systems supporting us. So far, the accumulated knowledge in the Earth System Sciences'

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1 Steffen W., *et al.*, "The trajectory of the Anthropocene: The Great Acceleration", *The Anthropocene Review*, 2, 81-98, 2015.

2 The scientific literature on the Anthropocene is endless. Three peer-reviewed scientific magazines on the Anthropocene have been available for a few years now. Please consult the following websites: www.futureearth.org and www.anthropocene.info.

3 Rockström J., M. Klum, *Big World, Small Planet*, Max Ström Publishing, Stockholm 2015.

articulated fields[4] clearly informs us that it is not possible to pursue the sustainability of human development if we are unable to learn to live within the now obvious biophysical limits of our supporting systems.

The international scientific community dealing with Global Change highlights how much the continuation of the functioning of the Earth System, which over the recent centuries has supported human wellbeing and the proliferation of human civilization, is now at risk. Scientific research is thus working hard to try and identify "thresholds"[5] and global and regional planetary boundaries,[6] which, once crossed, can generate unmanageable social and environmental changes by human society. The great distress we caused with our growing pressure to the planet's natural systems could thus activate a planetary "ticking time bomb" and profound changes could occur in feedback mechanisms, which from negative would become positive, so what used to cushion before, then produces an acceleration of the effects instead.

In short, the new Anthropocene epoch shows us that human activities have the potential to make the Earth system pass to states that can be irreversible and inadequate to support human life and that of other living species. Therefore, we must learn to live, with the greatest creativity and innovation, within a safe operating space for humanity, we have to live within a One Planet Perspective.[7]

The complexity of how to tackle the challenges of the future is clear to everyone. The latest UN data on human population growth were published in July 2015,[8] highlighting that today there are 7.3 billion people, almost 9 times the 800 million people thought to have lived in 1750, at the dawn of the Industrial Revolution. The population, still growing at a rate of 83 million a year, should reach, according to the medium variant (the most reliable one), 9.7 billion inhabitants by 2050. Even assuming that the fertility rate will continue to decline, global population should reach 8.5 billion in 2030, then 9.7 billion in 2050 and 11.2 billion in 2100, compared to the forecasts according to the medium variant. A population growth until 2050 is virtually unavoidable, even if the fertility rate should accelerate.

Agriculture represents humankind's most widespread use of the global dry land surface (40% of Earth's surface is used for agriculture and animal farming) and the human activity that causes the highest consumption of fresh water (globally, 70% of fresh water is used for irrigating crops) besides being the first cause of biodiversity loss and one of

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4 Please consult Future Earth report, the extensive international programme on global research and sustainability analysing global changes in the Earth system (www.futureearth.org).

5 Lenton T. M., *et al.*, "Tipping elements in the Earth's climate system", *PNAS*, USA, 105; 1786-1793, 2008; Scheffer M., *Critical transitions in nature and society*, Princeton University Press, Princeton, New Jersey, USA, 2009; Barnosky A. D., "Approaching a state shift in Earth's biosphere", *Nature*, 486; 52-58, 2012.

6 Rockström J., *et al.*, "A safe operating space for humanity", *Nature*, 461; 472-475, 2009; Steffen W., *et al.*, "Planetary boundaries: Guiding human development on a changing planet", *Science*, 347, 6223, 2015.

7 WWF, *Living Planet Report 2014. Species and spaces, people and places*, 2014.

8 United Nations Population Division, *World Population Prospects: the 2015 Revision*, 2015 (http://esa.un.org/unpd/wpp).

the major sources of greenhouse gas emissions (about 30% of global greenhouse gas emissions are due to agricultural activities, half of which is due to deforestation and the other half to farming).

The current situation offers an overall difficult picture:[9] crop production has almost reached a plateau, climate change, especially through the intensification of extreme weather phenomena, worsens annual yields, water crisis, the overexploitation of aquifers, including fossil ones, fertile soil loss, relentless transformation and destruction of natural systems, desertification, loss of biodiversity and the connected services that ecosystems provide benefitting our wellbeing and our economies (for instance, the role of pollinating species in agriculture), and the insane food waste at all levels, etc. This mix of problems has not yet been tackled and solved with the energy and determination required and unfortunately they are leading humankind towards an actual tipping point that could trigger planetary emergencies.

Many analyses have been carried out to identify the new agricultural scenarios for the near future. The authoritative International Assessment of Agricultural Knowledge, Science and Technology for Development[10] highlighted the need to abandon the conventional reductionist approach that separates agriculture from the environment and the environment from the fulfilment of human needs. The report points out that there is not just one approach for solving hunger and poverty, that the reintegration of livestock and crop production could drastically improve rural economies in the most degraded areas and that orphan crops and traditional seeds have a much better potential than previously thought. These are the innovations that will help feed humankind and the planet.

Agriculture is becoming a viable solution to mitigate climate change's effects, to reduce diet-related diseases and their connected costs and to make our cities more liveable, creating jobs in a stagnating global economy. In the rosiest future that we can imagine, and that we can absolutely create, some countries, currently plagued by food scarcity, could not only become self-sufficient but also start producing surpluses to help other nations.

These visions, to different degrees, are shared by those who study the future of food production. Today, first and foremost, we need to kick-start a sort of triple green revolution: increasing soil productivity without expanding the cultivated surface avoiding further land, air and water pollution (an engaging and winnable challenge for innovation and human ingenuity); reducing environmental impacts and sustainable management of water resources.

This challenge encourages everyone to imitate nature and its extraordinary evolution instead of going against it, creating an uninhabitable world, first of all for ourselves. The concept of the "circular economy" can work extremely well in agriculture. In many areas of the planet, eco-agriculture is already proving that it is possible to achieve good yields while safeguarding soil's organic matter and biological activities without exces-

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9 See amongst others Brown L. R., *Full Planet, Empty Plates*, W. W. Norton & Company, New York 2012.

10 To read this assessment, visit www.agassessment.org.

sive ploughing and practicing precision agriculture with targeted use of manure and fertilizers.

Several pieces of research, such as that of an authoritative group of experts led by Jonathan Foley,[11] points out that an important contribution to the goals of eradicating hunger, doubling food production by 2050 and reducing environmental damage caused by agriculture can come from some crucial solutions such as: stopping the expansion of farmland in tropical areas (the destruction of these ecosystems impacts heavily on biodiversity loss and CO_2 emissions deriving from deforestation), improving the productivity of soils with the lowest yields, increasing water and fertilizers use and efficiency at global level, reducing per capita meat consumption (with a vegetable-based diet we would have at our disposal an impressive amount of calories every year, 50% more compared to the current availability) and reducing waste in food chains (about 30% of all food produced at global level is thrown away, left to rot or consumed by pests).

Evidently, in order to do all this, we must change our approach and our actions and we must act soon. All the evidence at our disposal suggests that all that was good until yesterday will not be so tomorrow. Business as Usual (BAU) is no longer a valid option. To achieve tangible results, our top priority is to create meaningful partnerships amongst institutions, companies, NGOs and civil society to implement successful programmes epitomizing "the seeds for good Anthropocene" as stated by the dedicated international programme Seeds of Good Anthropocene. In this, the role of young generations is paramount because they are the ones who, first and foremost, will live through the Anthropocene. We must be aware that we can and have to move within a Safe Operating Space set by planetary boundaries that cannot be exceeded. As Johan Rockström reminds us, this space must be the central component of our lives and of our way of doing business. It must become second nature, like breathing. Once we have managed to do this, it will be much easier to lay the foundations for future generations to thrive.[12]

** Scientific Director for WWF Italy*

11 Foley J., *et al.*, "Solutions for a Cultivated Planet", *Nature*, 478; 337-342, 2011.

12 Visit Seeds of Good Anthropocene website (www.goodanthropocenes.net).

EATING PLANET

FOOD AND SUSTAINABILITY: BUILDING OUR FUTURE

Global food system's sustainability is a worldwide challenge.
To reach it means dealing with an extremely complex system, where traditional cultures interact with profound changes of food and consumption models. Impacts on health go hand in hand with those on ecosystems and inequalities of access to food risk being exacerbated by the effects of climate change.

This new edition of *Eating Planet* is a collection of the most recent developments of the debate and research on the four large areas characterizing **Barilla Center for Food & Nutrition's** approach: "Food for All", "Food for Sustainable Growth", "Food for Health", "Food for Culture", with the contribution of a network of prestigious experts and opinion leaders: **Pavan Sukhdev, Gianfranco Bologna, Barbara Buchner, Paolo De Castro, Danielle Nierenberg, Paul Roberts, Carlo Petrini, Riccardo Valentini, Hans R. Herren, Tony Allan, Ricardo Uauy, Sara Farnetti** and **Camillo Ricordi, Gabriele Riccardi, Marion Nestle, Aviva Must, Alexandre Kalache, Shimon Peres, Jamie Oliver, Ellen Gustafson, Michael Heasman, Vandana Shiva**.

Eating Planet also suggests the priority initiatives that decision makers, economic players and citizens should implement in the various fields involved. It furthermore contains the *Milan Protocol* and *Youth Manifesto's* action platforms, elaborated within BCFN's action plans and to turn Expo 2015's ideas into action.

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